

# NEWS AND PRACTICAL INFORMATION ABOUT AUTOMOBILES



## MECHANICAL REGULATION IN THE AUTOMOBILE'S ELECTRICAL SYSTEM DESCRIBED BY EXPERTS

(By Permission from Motor Age.)  
The following examples of mechanical regulation in the electrical system of the automobile are described by David Penn Moton and Darwin S. Hatch as an instalment in their series of lessons prepared for the benefit of motor car owners:

Generator operated at a constant speed by a slipping clutch controlled by a centrifugal governor.—If a shunt generator be operated at a constant speed the voltage will build up to a definite value and remain practically constant. The value of this definite voltage can be adjusted by changing the value of the resistance of the shunt field winding and, unless there is a change in the speed or resistance of the field, will remain practically constant so long as there is no change in the value of the current the generator is delivering.

The regulation of a number of different systems put on the market by the Gray & Davis Company is accomplished in this manner. In the systems a series field winding usually is provided. This series field is arranged to carry all or a certain part of the current delivered by the generator, and its magnetizing action assists the magnetizing action of the shunt field and causes an increase in the value of the field strength with an increase in current delivered, and hence an increase in generated voltage with an increase in the current output. The magnetizing action of this series field is usually adjusted so that the increase in generated voltage is just enough to counteract any loss in the armature and connecting leads, due to the increased output, which results in the voltage at the terminals remaining fairly constant for all loads.

The cross section of a generator of this type, made by the Gray & Davis Company, is shown in Fig. 1, and the operation of the driving clutch will be apparent after a careful inspection of the figure.

A friction clutch used by the Auto-Lite Company in some of its earlier equipments for operating the generator at a constant speed is shown in Fig. 2. The governor consists of a drum, D, fastened to the driving shaft, and of two friction shoes, B, each being attached to a weight, W, normally held against the inside surface of the drum by the action of coiled springs placed in the ends of the arm, A, as the speed at which the arm A rotates increases there is a tendency for the weights, W, to be thrown outward from the point about which they rotate. The two arms carrying the weights are pivoted at the ends of the arm, A, and as the weights are thrown outward the action of the springs holding the friction shoes against the cylinder is decreased. The speed at which the clutch slips may be changed by moving the weights, W, toward or away from the points at which the arms carrying them are pivoted. The nearer the weights are to these points the higher the speed necessary for the clutch to slip, and, likewise, the further these weights are away from these points the lower the speed necessary for the clutch to slip.

Regulation by Centrifugal Governor.—Centrifugal Governor Used in Inserting Resistance in the Charging Circuit.—A good example of this type of regulation is found in a machine manufactured by the Yessie Company. In this machine the position of a rheostat arm on the contact segments of a small rheostat is controlled by the action of a centrifugal governor. The end of the rheostat arm rests normally and at low engine speeds, is not electrically connected to any of the other circuits. The charging circuit for the battery is connected to the rheostat arm, and when the end of the arm is on this insulated segment the electrical connection between the generator and the battery is not complete.

The end of the arm travels over the contact segments of the rheostat with an increase in speed, and when it comes in contact with the second point the circuit connecting the generator and battery is closed. A further movement of the arm inserts resistance in series with the generator and battery and thus prevents an excessive charging current.

Some of the earlier Delco systems made use of an amperage hour meter that measured the quantity of electricity put into and taken out of the battery and gave an indication of these quantities on a suitable dial. The pointer on the indicating dial of this instrument travels in one direction when the battery is charging and in the opposite direction when the battery is discharging. The difference in the indications of this pointer at two different times is a measure of the net quantity of electricity put in or drawn from the battery during the interval between taking the two readings.

A double set of contacts is carried in the containing case of the instrument, through which the field current of the generator must pass. A movement of the pointer of the meter past a certain position causes one set of these contacts to open, and, with further movement past this point in the same direction, causes the second set of contacts to separate. When the first set of contacts is opened a resistance in inserted in series with the field, and the charging current is reduced. When the second set of contacts opens the field circuit is opened altogether, and the charging of the battery is practically stopped, as there is no field, except that due to residual magnetism, for the armature of the generator to revolve.

The reverse operation of these contacts takes place when the battery discharges and the pointer is turned in the opposite direction. With this system the rate at which the battery is charged is governed by the amount of charge in the battery. The hand on the meter must be moved in the direction of charge at certain intervals, because there must always be a greater number of amperes hours put into the battery than it can supply. The meter hand is returned in such a way that

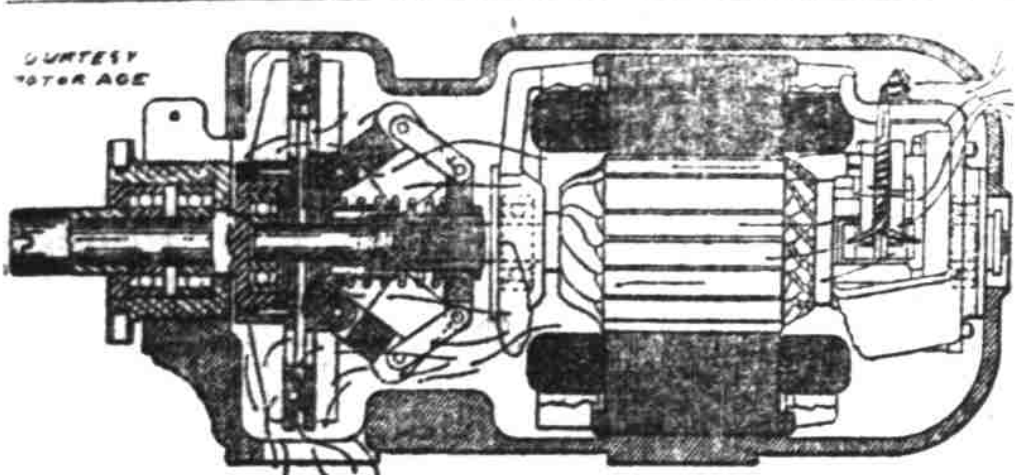


FIG. 1.—A slipping clutch operates this Gray & Davis generator

### SPARK PLUG TELLS HOW IT'S FEELING

A spark plug which provides means of indicating its working condition outside the engine cylinder, adaptable to any number of automobile cylinders and preventing oil or other liquid from short-circuiting the terminals of the plug, is the invention of R. D. Fassett, a millwright of Denver.

The plug is of porcelain or any other non-conducting material, in which are imbedded two wires, the opposite ends of which protrude outside the body of their connection with a source of electricity, providing terminals between which the auxiliary spark is formed. With this device it is possible, according to the inventor, to determine at any time whether all cylinders are firing, and to go directly to those cylinders which are not firing at any time and repair them.

Fassett is negotiating with manufacturers in the hope of selling his product on a royalty basis.

equipment on the different cars is made by the manufacturers of the equipment or at the factory where the equipment is installed, and is correct for that particular make and model of car under ordinary conditions. Under no conditions should this adjustment be changed unless the person making the change is positive that such a change is required, and even then it is best to have an experienced man make the adjustment, as more damage may be done than good. Difficulties arising from improper change in the adjustment of the regulator may not be apparent at the time the change is made, and the car may run for a considerable period before there is definite evidence of the difficulty. In the majority of cases low generator output is due to improper care of the commutator and brushes, in not keeping all the various electrical connections clean and tight or in not giving the battery the necessary attention.

Occasionally unusual conditions may arise in the operation of the car, which will demand an increase in the generator output. For example, the addition of extra electrical equipment may necessitate an increase in the rate at which the battery is charged for a given speed of the car. It is always advisable to make sure that you are not demanding a larger output from the battery than it is capable of handling under ordinary conditions, as permanent damage to the electrical equipment will be the ultimate result.

In some cases a car may be driven a great deal more at night than in the daytime, and with the lamps lighted the demands on the battery will be increased. Under these conditions it is necessary to increase the rate at which the generator will charge the battery for a given engine speed. Owing to the lower efficiency of the battery in the winter and the greater use of the lamps, the charging rate of the generator should, as a rule, be increased. It may be advisable to lower the charging rate of the generator or to stop the charging operating alto-

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## MOTORISTS SHOULD FILL STORAGE BATTERY AT LEAST ONCE A WEEK

Willard Expert Tells Why it is Necessary to Keep the Battery Filled

However little the average motorist may know about his storage battery, he knows at least that it must be given distilled water at regular intervals. Most motorists do it without having any idea why it is necessary.

Harry Henry of the local Willard storage battery service station has undertaken to explain for the reader's benefit why it is necessary to keep the battery filled with water.

"The water," says Henry, "that the car owner puts into his storage battery replaces that which has evaporated. The rate of evaporation naturally depends more or less upon the weather. In summer the battery should be filled up at least once a week, because in hot weather evaporation is quicker. In winter it is generally necessary only once every two weeks.

"The conditions under which a car is operated also help determine the frequency of filling. For instance:

"The charging of the battery generates heat in it. This naturally makes evaporation quicker, so that if a car is being run over long distances with infrequent stops and sparing use of the lights there is a tendency for the battery to become heated, sometimes in fact, overheated. The owner of a car run under such conditions naturally will find it necessary to fill his battery with distilled water more frequently than the man who is using his machine for city running, with frequent stops and low speed, hence, low rate of charging.

"Under no conditions whatever should the car owner himself put acid in the battery to bring the electro-

lyte up to the proper specific gravity. Normally, no matter how run down the battery may be, charging will restore it and restore the specific gravity of the electrolyte remains constant. It is the water only that evaporates. Adding acid, then, does not restore the battery, but ruins it, for it makes the solution too strongly acid, thus causing rapid disintegration of the plates and general breakdown of the battery.

"It is imperative to use distilled water or pure rain water that has not come in contact with any metal. Any mineral substance or foreign chemicals in the electrolyte will not only upset the chemical action that goes on inside the battery but also will rapidly ruin the plates.

"Keeping the battery filled with water means keeping the plates covered one-half inch with the electrolyte. This is absolutely necessary not only for the preservation of the plates themselves, but to enable these plates to do their work. If only half of them is exposed to the action of the electrolyte, naturally only half as much power will be generated as when they are completely covered with the electrolyte. The battery is not able to give out the amount of power that it is designed to.

"On the other hand, when the battery is being charged, there is great danger of its being ruined from overheating, because the charge which it receives is designed to affect the whole battery; that is, all of each plate. If the plates are not covered with electrolyte, the whole plate is not affected by the charge. For instance, if the plates are half covered with water and the battery being charged at a rate designed for a battery fully filled with water, that half exposed to the action of the electrolyte is getting the entire charge."

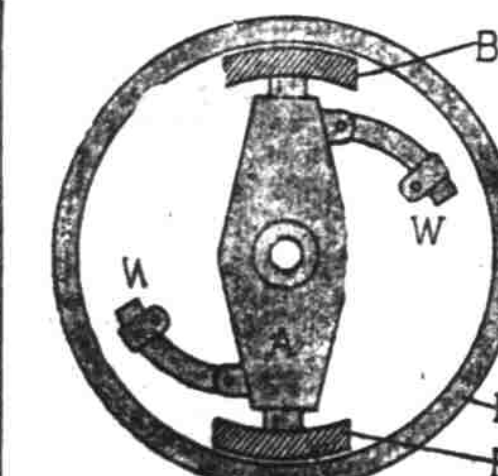


FIG. 2.—This Auto-Lite friction clutch also tends to maintain a constant speed

## CADILLAC GETS BEST OF FIGHT

Car Damages Locomotive to Extent of \$1.31; Truck Escapes Without Damage

In the thriving days of the horse age, now rapidly passing away, railroads were constantly besieged with claims of the death and injury of horses, both in the city and country. Sometimes the owners got damages and sometimes nothing, but the horse always got the worst end of the deal for he never was a match for the locomotive.

With the coming of the motor era, the worm has turned. The other day the Chisholm & Moore Mfg. Co., of Cleveland, received the following letter from the superintendent of the Pennsylvania lines:

"I beg to advise that on January 8th last while our engine 7749 was passing over East 55th street very slowly, speed about three miles per hour, it was run into by your automobile truck No. 131199, damaging our locomotive to the extent of \$1.31."

"The owners, surprised, of course investigated at once. They found that the driver of their Packard truck had been at fault in trying to push the locomotive off the track. As the truck suffered no injury whatever, they gladly paid the \$1.31.

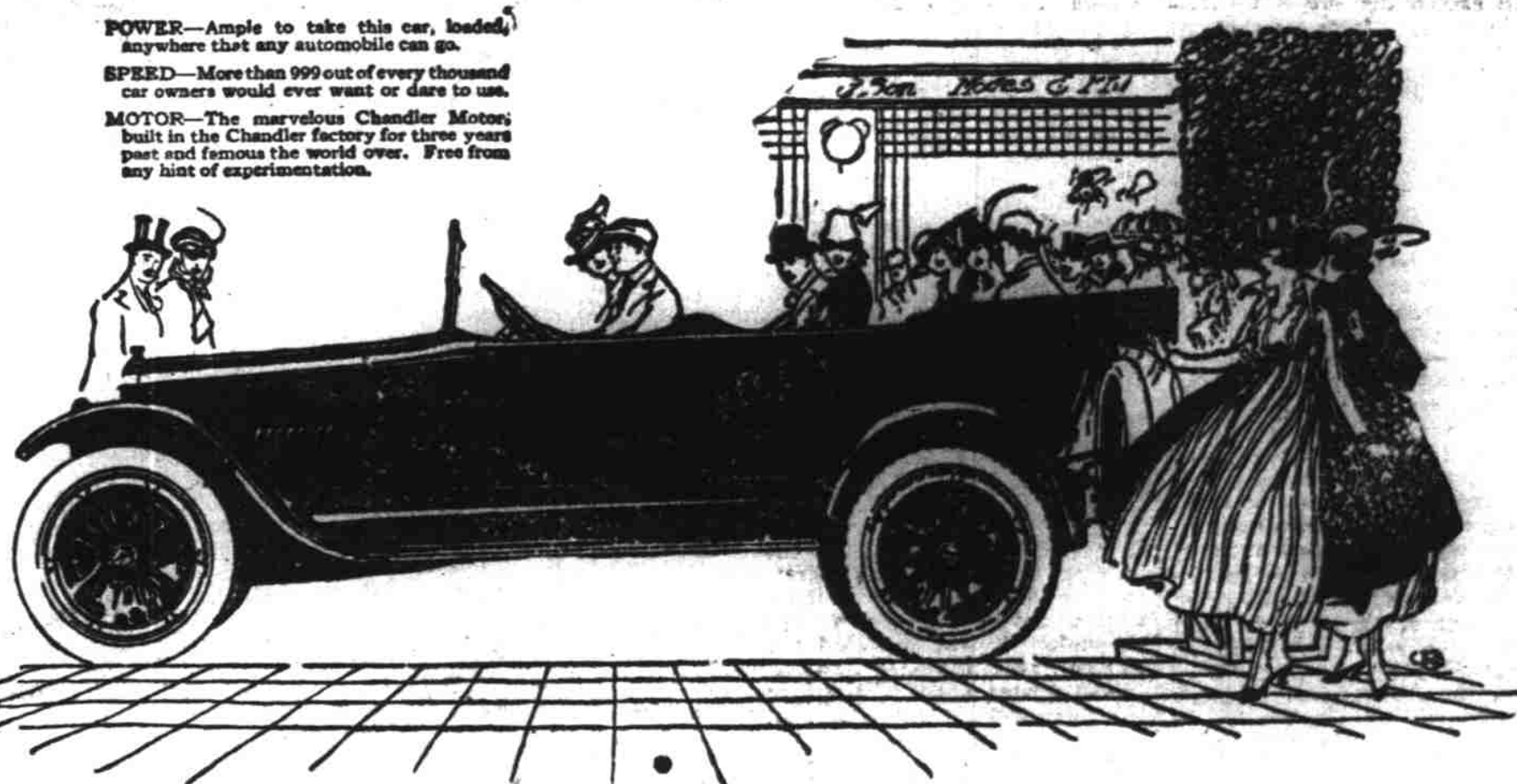
"Of course we do not claim because of this one happening that a Packard always will come out so luckily in an encounter with a mallet compound locomotive," says C. L. Guyman, assistant truck sales manager of the Packard Company, "yet this incident speaks well for the quality of material and stout construction of our product."

gether on a long drive by disconnecting the generator, short-circuiting it or removing the field fuse, depending on the kind of generator and the method of regulating its output.

In some cases a special switch, called the touring switch, is provided. This produces the necessary changes in connection when it is turned to the position that causes a reduction in generator output.

## CHANDLER SIX

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**SPEED**—More than 99 out of every thousand car owners would ever want or dare to use.  
**MOTOR**—The marvelous Chandler Motor, built in the Chandler factory for three years past and famous the world over. Free from any hint of experimentation.



## THE CHANDLER CHECKS With High-Priced Cars

CHANDLER checks in the most essential features of design and construction and equipment with the high-priced cars. Chandler performs.

The manufacturer of one Six can make just as big claims as any other. The Chandler Company likes to deal in facts.

For years the Chandler Company has made the Chandler a fact-car, not a claim-car. Claims sell a lot of cars, but facts sell more cars, just as fast as the buyers learn the facts.

The Chandler is honestly built and moderately priced. There is no other Six, selling at anything like the Chandler price, which will give you so much dependable service.

The thousands of motor car buyers recognize the mechanical superiority of the Chandler Six, mechanical superiority achieved through the Marvelous Motor—the exclusive Chandler Motor, powerful, flexible, simple and economical—and through the excellence of design and construction of the entire Chandler chassis.

So many recognize its superiority that the Chandler has earned a front rank position in the industry. So many recognize it that twenty-five thousand buyers this year will choose the Chandler as the Six to be preferred above all Sixes.

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## Liberty Loan Given Boosts By Cole Firm

George Wells of Hawaiian Garage Will Pay \$51 for \$50 Liberty Bond in Trade

Uncle Sam not only needs men, but he also needs money! This money must be raised at once, and every possible effort is being made by the government to float the Liberty loan.

In a patriotic effort to help sell the bonds, the Cole Motor Car Company has come to the front with a plan which should prove of material assistance.

The plan as announced by the Cole Company in a communication to George Wells of the Royal Hawaiian Garage, distributors for the Cole eight, is as follows:

For every \$100 Liberty bond the Cole Company or any of its dealers or distributors in any part of the country will allow a buying value of \$102 on the Cole eight. A \$50 bond will have a buying value of \$51, and in the same ratio a \$1000 bond will have a buying value of \$1020.

This Liberty bond will be taken either in part or in full payment for the purchase of the Cole, and an arrangement has been made by the Cole Company whereby the bonds may be redeemed at a later date by the owner if he so desires.

"This plan of the Cole Company," says Wells, "offers every person in the country an excellent opportunity to serve the country and at the same time benefit financially.

"Our government is in need at once of the support of every one of its citizens. It must borrow from them \$2,000,000,000 at once. And this must be done with the least possible disturbance to the business fabric of the country. If this Cole plan is adopted by all manufacturers and merchants the money will be raised at once and without any flurry."

An efficient cartridge lock for Fords is set in the floor of the car and serves as a magneto circuit breaker, pressure on the foot lever automatically shutting off the engine and stopping the car. A serial key is used to unlock the car, making it unnecessary to use the regular coil switch key. The contraption costs 80 cents.